PENTAIR

SAPAG

Cast Gate Valves Pressure Seal -Style A- Wedge Gate and Parallel Slide Configuration

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Section 1 - Valve Storage

1.1 Preparation and Preservation for Shipment

All valves are properly packed in order to protect the parts that are subject to deterioration during transportation and storage on site. In particular, the following precautions should be taken:

1. The valves must be packed with the wedge in the closed position.
2. The weld ends surface shall be protected with suitable protective like Deoxaluminite. The end shall be closed with plywood or plastic disc fixed at the edge by strips.
3. All actuated valves must be carefully securely palleted or crated, in order to ensure that the parts of actuator (especially pneumatic piping or accessories) do not extend beyond the skid/ crate.
4. The type of packing must be defined in the Customer's Order and shall be appropriate to ensure safe transportation to final destination and eventual conservation before installation.

1.2 Handling Requirements

A - Packed Valves

Crates: Lifting and handling of the packed valves in crates will be carried out by a fork lift truck, by means of the appropriate fork hitches.

Cases: The lifting of packed valves in cases should be carried out in the lifting points and at the center of gravity position which have been marked. The transportation of all packed material must be carried out safely and following the local safety regulations.

B - Unpacked Valves

1. The lifting and the handling of these valves has to be carried out by using appropriate means and at respecting the carrying limits. The handling must be carried out on pallets, protecting the machined surfaces to avoid any damage.
2. With valves of large dimensions, the sling and the hooking of the load must be carried out using the appropriate tools (brackets, hook, fasteners, ropes) and load balancing tools in order to prevent them from falling or moving during the lifting and handling.

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Valve slinging

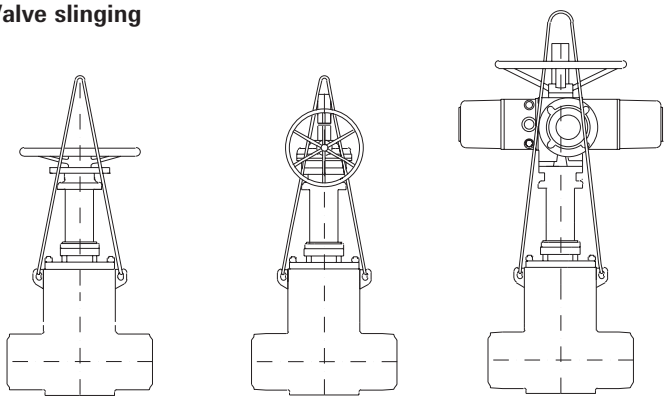


Figure no. 1

1.3 Storage and Preservation before Installation

In case the valves have to be stored before installation, the storage has to be carried out in a controlled way, and has to be performed in accordance with the following criteria:

1. The valves have to be stocked in a closed, clean and dry storage room.
2. The wedge must be in the closed position, and the end faces must be protected with plastic or wooden discs fixed with straps. If possible, keep the original protection.
3. Periodical checks have to be carried out in the storage area to verify that the above mentioned conditions are maintained.

For actuated valves, in addition to the above, please refer to the warnings in the manual of the actuator.

Note

Storage in an open area for a limited period can be considered only in case the valves have appropriate packing (packed in cases lined with tarred paper, and contents well protected with barrier sacks).
Do not place consignment packages directly on the ground.
Do not expose consignment packages to the weather or directly to the sun.
Check the packaging every two months.

Caution

For valve handling and/or lifting, the lifting equipment (fasteners, hooks, etc.) must be sized and selected while taking into account the valve weight indicated in the packing list and/or delivery note. Lifting and handling must be made only by qualified personnel.
Do not use the lifting points located on the actuator, if any, to lift the valve. These lifting points are for the actuator only.
Caution must be taken during the handling to avoid that this equipment passes over the workers or over any other place where a possible fall could cause damage. In any case, the local safety regulations must be respected.

Section 2 - Installation

2.1 Preparation before Installation

1. Carefully remove the valve from the shipping package (box or pallet) avoiding any damage to the valve or, in case of automated valves, to the electric or pneumatic/hydraulic actuator or instrumentation.
2. Clean the inside of the valve using an air line. Ensure that there are no solid objects such as pieces of wood, plastic or packing materials within the valve or on the valve seat.
3. Confirm that the materials of construction listed on the valve nameplates (service and temperature) are appropriate for the service intended and are as specified.
4. Define the preferred mounting orientation with respect to the system pressure. If any (see arrow on the body), identify the upstream side (high pressure) and downstream side (low pressure).

Warning

Verify that the direction of the flow in the line corresponds to the arrow indicated on the valve body. Valves without the arrow are bi-directional.
See the actuator user manual for the actuator preparation.

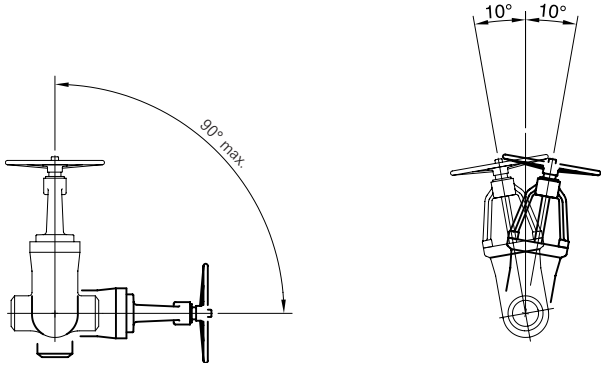
2.2 Installation Instructions

Gate valves are normally installed in horizontal pipe with vertical stem.
These valves can also be installed in vertical or horizontal pipe with stem other than vertical, but this may require special construction depending on valve size, service condition, material and type of operator.
For a correct operation, Sapag recommends that the valve shall be installed and oriented following the indications of fig. 2.
This can help minimize any problem associated with solid particles present in the fluid that otherwise could deposit in the lower part of the body and be obstacle to the wedge complete closure.
Unless otherwise recommended by Sapag, the valve should be installed with the wedge in the closed position, to ensure that the seat ring in the wedge is not damaged during installation.
Particular care should be taken with those valves equipped with 'fail-open' actuators.
For operating temperatures above 200°C (392°F) thermal insulation of the valve body is recommended.
Handling and lifting of the valves during installation MUST be performed following the same criteria and instructions described in previous points "1.2 Handling Requirements" and "1.3 Storage and Preservation before Installation".

Buttweld Valves

Position the valve and check the alignment with the pipe, then proceed with welding, in accordance with the applicable welding procedure.

Figure no. 2
Installation positions recommended



Important

After the valves installation and before the line testing, it is recommended to perform an accurate cleaning of the lines to eliminate dirt and any foreign objects that could seriously jeopardize the tightness between seat/disc and the correct operation of the valve.

2.3 Valve Verification before Start Up

1. Tighten the packing just enough to prevent stem leakage. Over-tightening will decrease packing life and increase operating torque. The bolt torque figures for the packing bolts can be calculated as indicated in Table I.
2. Check the operation of the valve by stroking it to "full open" and "full close".
3. If the valve has been stored for a long time, check the bolt torque for bolting (pos. 31) in accordance with table II.

Important

If piping system is pressurized with water for testing, and in case the piping system has been shut down after testing for a long time, the following recommendations should be adopted.
a. Use corrosion inhibitor with water to pressurize the piping system
b. After testing, the piping system should be depressurized and the test water completely drained.

2.4 Operations Instructions

1. Style A Series Gate Valves do not require special care to work properly.
   The following instructions will help provide a satisfactory and long life service.
2. Make sure to perform periodic valve verification as described in paragraph 2.5.
3. In case of actuated valves always follow the specific instructions given by the actuator's manufacturer.
4. Never change the setting of torque and/or limit switches which have been carefully set during the final test at Sapag workshop.

Table I: Bolt Torque Figures for Packing Bolts

For System pressures < 2533 psi	For System pressures ≥ 2533 psi
Torque (ft lbs) = (24.87) x (OD2 _ ID2) x (d)	Torque (ft lbs) = (S.P./101.8) x (OD2 _ ID2) x (d)
Torque (Nm) = multiply Torque (ft lbs) x 1.3558	
Where:	OD = Stuffing Box Bore (In.)
	ID = Stem Diam (In.)
	d = Gland Stud Diam (in.)
	S.P. = System Pressure (psi)

This "Torque method" may result in more or less than 30% compression.

2.5 Periodic Valve Verification during Service

A - Normal Check

1. Verify monthly that there is no leakage from packing or in the body/bonnet area. If the leakage has been detected from the packing, tighten nuts according to the procedure described in Section 3.
   If the leakage does not stop, follow the procedure for packing maintenance (3.1).
   If the leakage has been detected from the body/bonnet, tighten the nuts (pos. 31) as indicated in Table II.
   If the leakage does not stop, follow the maintenance procedure for the replacement of the body/bonnet gasket (3.2, 3.3).
2. Every 2 / 3 months, depending on operating frequency, verify the greasing of bearings and stem thread.
3. For actuated valves, in addition to the above, please refer also to the warnings in the actuator manual.

B - Preventive Actions

1. Every 3 months verify the tightness of gland bolts.
2. Every 6 months on motorized valves and every 8 months on hand operated valves, grease stem and bearings.
3. Every 12 months check the travel of the gland follower, setting a new packing when the end of the travel is approaching.
4. Every 4 years disassemble the critical service valves and/or actuated valves, verifying the sealing surfaces and lap them again when necessary. Substitute the bonnet gasket and the packing, grease the stem.
5. For the actuator, proceed as indicated in its maintenance manual.

Troubleshooting Guide

Symptom	Possible Cause	Solution
Stem packing leaking	1. Gland flange nuts too loose 2. Packing damaged	1. Tighten gland flange nuts. 2. Replace packing (See Paragraph 3.1)
Body-Bonnet leaking	1. Gasket bolting loose (pos 31) 2. Gasket damage	1. Tighten bolting (pos 31) 2. Replace the gasket
Valve leaking	1. Valve not fully closed 2. Debris trapped in valve 3. Sealing surface damaged	1. Close valve 2. Cycle and flush (with valve open) to remove debris 3. Recondition the seat surface
Jerky operation	1. Packing is too tight 2. Air supply inadequate (for pneumatic act.)	1. Loosen gland nuts, cycle the valve, retighten 2. Increase air supply pressure
Back seat leaking	1. Back seat damage	1. Replace the back seat

Table II:
Bolt Torque to Ensure Tightness of Pressure Seal Gasket

Position 31 for Gate Valves

Stud	Torque ft.lbs.	Torque Nm
3/8	18	24,5
1/2	37	50
5/8	74	100
3/4	125	170
7/8	207	280
1	310	420
1 1/8	443	600
1 1/4	627	850
1 3/8	811	1100

Important

To ensure tightness of Pressure Seal gasket, pull up bolts must be tightened when valve is under fully hydrostatic test pressure.

Section 3 - Maintenance

The Style A Series Valves have been designed to require minimum maintenance.
This manual describes on site repairs as:
- Packing Replacement
- Body/Bonnet Gasket Replacement

All the other repairs should be performed by Sapag or Nominated Service Company.

3.1. Packing Maintenance

If leakage is observed through the packing, tighten the gland nuts slowly and evenly until the leakage stops.

Caution

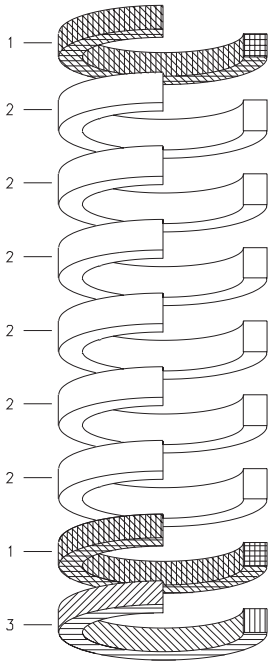
Do not over-tighten packing gland nuts. Over-tightening will increase the torque required to operate the valve.
When tightening the gland nut, use half-turn increments until leakage has stopped.

Please refer to Figure no. 4.
To replace the packing proceed as follows:

Warning

Before starting any maintenance, depressurize, drain and vent the line; check that the valves are not in temperature; disconnect any electrical power supply.
Failure to do so may cause serious personal injury and/or equipment damage.

1. Open completely the valve up to the backseat position.
2. Remove the nuts (16) of the gland bolts (15)
3. Lift the gland flange (10) and the gland (9)
4. Remove the worm-out packing using a hooking wire
5. For a better tightness, proceed to an accurate cleaning of the stem and stuffing box and make sure there are no scratches or signs of seizing
6. The repacking shall be carried out by placing one ring at a time around the stem, inside the stuffing box and by making sure that they are correctly oriented. Press it into the bottom (refer to Figure no. 3).
7. When the stuffing box is filled, replace the gland (9) and gland flange (10) in their original position.
8. Tighten gland nuts in accordance with Table I (Bolt Torque figures for Packing Bolts).
9. Cycle the valve.
10. Pressurize the line.
11. If a leakage is detected, tighten the gland nuts slowly and evenly until the leakage stops.



1 = Braided graphite
2 = Die formet graphite (5 or 6 ring)
3 = Metal ring

Figure no. 3

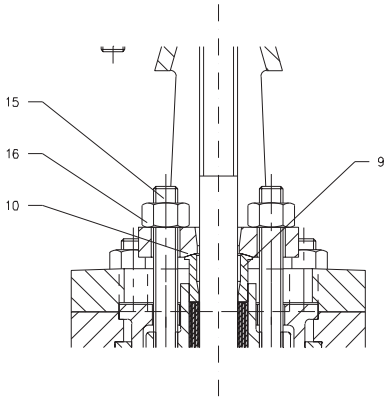


Figure no. 4

3.2 Bonnet Gasket Replacement

Warning

Before starting any maintenance, depressurize, drain and vent the line; check that the valves are not in temperature; disconnect any electrical power supply.
Failure to do so may cause serious personal injury and/or equipment damage.

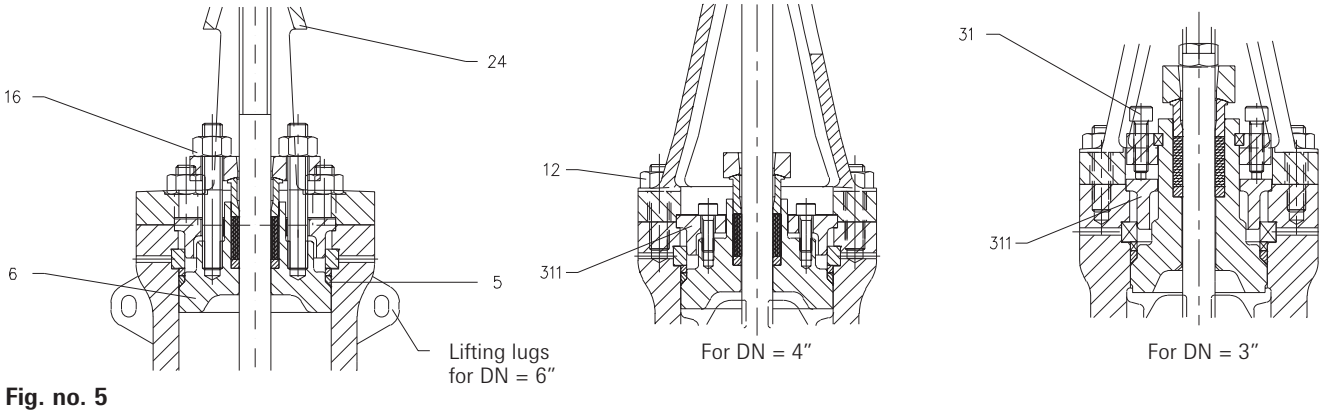


Fig. no. 5

Please refer to Figure no. 5.

1. Unscrew the body bonnet nuts (pos.12) and the gland nuts (pos.16)
2. Lift up the yoke (pos.24) operating by the handwheel or gearbox handwheel
3. When the stem nut is free from the stem threads, lift up the yoke.
4. Unscrew the nuts (pos.31).
5. Remove the retaining ring (pos.311).
6. Remove the segment rings, push them out from the body groove by using the body holes placed radially on the top of the body.
7. Lift up the bonnet (pos.6) and pressure seal body gasket (pos.5). Make sure not to damage the packing. We suggest to replace the packing when changing the body gasket.
8. Carefully clean all the gasket housing and lubricate with suitable grease.
9. Replace the body gasket.
10. Reassemble all parts following backwards the above mentioned steps.

Caution

The nuts (pos.31) need to be retightened after valve first pressurization, as indicated in Table II.

Section 4 - Valve Removal

If the valve needs to be removed from the line for some extraordinary reason, the user should ensure the following:

1. The valve is depressurized, drained and vent.
2. The pipe shall be cut as far away from the valve as possible.

Section 5 - Greases and Special Tools

5.1 Greases

To lubricate the bearings on manual and gearbox operated valves, we suggest to use the grease AGIP GRMUEP2 or an equivalent product, as showed in the following table:

Table III: Grease and Lubricant List

Manufacturer	Grease
AGIP	GRMUEP2
API	PGX2
BP	GREASE LTX2
ESSO	BEACON 2
FINA	FINAGREASE HP FINAGREASE EPL2
MOBIL	MOBILUX EP2
Q8	REMBRANDT EP2
SHELL	ALVANIA R2 SUPERGREASE A
TEXACO	MULTIFAK EP2 GREASE L2
TOTAL	MULTIS EP2 MULTIS 2
VISCOL	SIGNAL ROLSFER 2
STATOIL	UHIWAYLI LI G2

For the lubrication of the stem thread, use the grease SIGNAL CEP 30 produced by Viscol. As an alternative you can utilize:
- CEPLATTYN 300 produced by REINER-FUCHS
- GRAFLOSCON produced by KLUBER

You can also use a grease having more than 25% pure graphite content (carbon 98%) granulometry 5m, without any abrasive agent.
For the lubrication of the actuator, refer to the relevant manual.

5.2 Special Tools

No special tool required for the Maintenance Operation described in this Manual.